

## CLAIMS

1. A process for the temporary supply of a back-up quantity of a "first" gas to maintain the level of production of the first gas from a cryogenic separation of a gaseous mixture comprising the first gas and at least one other gas in the event of reduction in the  
5 level of production of said first gas from the separation, said separation comprising:

separating the mixture, or a mixture derived therefrom, in at least one cryogenic distillation system to produce liquefied first gas, the or each system retaining a portion of said liquefied first gas as inventory; and

10 vaporising a further portion of said liquefied first gas by indirect heat exchange against a process stream in at least one heat exchanger to produce said first gas; said process comprising, in the event of reduction in the level of production of said first gas from the separation, withdrawing liquefied first gas inventory from the or at least one of said cryogenic distillation systems and vaporising the withdrawn liquefied first gas inventory to produce said back-up quantity of first gas.

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2. The process according to Claim 1 wherein the process operates when the or at least one of the cryogenic distillation systems ceases to produce liquefied first gas.

3. The process according to Claim 1 wherein at least a portion of the  
20 vaporisation duty required to vaporise said withdrawn liquefied first gas inventory is provided by heat inventory from the or at least one of said heat exchangers.

4. The process according to Claim 1 wherein there is one cryogenic  
25 distillation system and said system ceases to produce liquefied first gas, said process comprising withdrawing liquefied first gas inventory from said cryogenic distillation system and vaporising the withdrawn liquefied first gas inventory to produce said back-up quantity of first gas.

5. The process according to Claim 1 wherein there is more than one  
30 cryogenic distillation system and one of said cryogenic distillation systems ceases to produce liquefied first gas, said process comprising withdrawing liquefied first gas inventory from the cryogenic distillation system in which liquefied first gas production has ceased and vaporising the withdrawn liquefied first gas inventory to produce said back-up quantity of first gas.

6. The process according to Claim 1 wherein there is more than one cryogenic distillation system and one of said cryogenic distillation systems ceases to produce liquefied first gas, said process comprising withdrawing liquefied first gas inventory from the or each cryogenic distillation system in which liquefied first gas production has not ceased and vaporising the withdrawn liquefied first gas inventory to produce said back-up quantity of first gas.

7. The process according to Claim 6 wherein, for each cryogenic distillation system, said separation further comprises:  
compressing said mixture to produce compressed mixture;  
dividing said compressed mixture or a mixture derived therefrom into at least two portions;  
cooling a first portion by indirect heat exchange in a heat exchanger and feeding the resultant cooled first portion to the cryogenic distillation system for separation;  
further compressing a second portion in a booster compressor to produce further compressed mixture; and  
cooling and condensing said further compressed mixture by indirect heat exchange in the or a further heat exchanger and feeding the resultant cooled and condensed further compressed mixture to the cryogenic distillation system for separation,  
said process further comprising, in the event of one of said cryogenic distillation systems ceasing to produce liquefied first gas, increasing the flow of the second portion through the booster compressor of the or each remaining cryogenic distillation system such that the resultant increased flow of further compressed mixture through said the or further heat exchanger of the or each remaining cryogenic distillation system provides a portion of the vaporisation duty required to vaporise said withdrawn liquefied first gas inventory to provide said back-up quantity of first gas.

8. The process according to Claim 1 wherein the process is initiated automatically when the or at least one cryogenic distillation system ceases to produce liquefied first gas.

9. The process according to Claim 1 wherein liquefied first gas is stored for vaporisation in at least one vaporiser to produce back-up first gas in the event of reduction in the level of production of said first gas from the separation, said process operating only during the period of time required for the or each vaporiser to come on-  
5 line.

10. The process according to Claim 1 wherein the first gas is produced in more than one cryogenic distillation system and is supplied to more than one downstream processing unit, said process being operated only during the period of time  
10 required to turndown or shutdown one of the downstream processing units in the event that one of the distillation systems ceases to produce liquefied first gas.

11. The process according to Claim 1 wherein the gaseous mixture is air and the first gas is one of oxygen, nitrogen or argon.  
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12. The process according to Claim 11 wherein the gaseous mixture is air and the first gas is oxygen.

13. A process for the temporary supply of a back-up quantity of a "first" gas to  
20 maintain the level of production of the first gas from a cryogenic separation of a gaseous mixture comprising the first gas and at least one other gas in the event of reduction in the level of production of said first gas from the separation, said separation comprising:  
separating the mixture, or a mixture derived therefrom, in one cryogenic distillation system to produce liquefied first gas, the cryogenic distillation system retaining  
25 a portion of said liquefied first gas as inventory; and  
vaporising a further portion of said liquefied first gas by indirect heat exchange against a process stream in at least one heat exchanger to produce said first gas;  
said process comprising, in the event of reduction in the level of production of said first gas from the separation due to said cryogenic distillation system ceasing to produce  
30 liquified first gas, withdrawing liquefied first gas inventory from the cryogenic distillation system and vaporising the withdrawn liquefied first gas inventory to produce said back-up quantity of first gas.

14. A process for the temporary supply of a back-up quantity of a "first" gas to maintain the level of production of the first gas from a cryogenic separation of a gaseous mixture comprising the first gas and at least one other gas in the event of reduction in the level of production of said first gas from the separation, said separation comprising:

5 separating the mixture, or a mixture derived therefrom, in more than one cryogenic distillation system to produce liquefied first gas, each system retaining a portion of said liquefied first gas as inventory; and

vaporising a further portion of said liquefied first gas by indirect heat exchange against a process stream in at least one heat exchanger to produce said first gas; 10 said process comprising, in the event of reduction in the level of production of said first gas from the separation due to one of said cryogenic distillation systems ceasing to produce liquefied first gas, withdrawing liquefied first gas inventory from the cryogenic distillation system in which liquefied first gas production has ceased and vaporising the withdrawn liquefied first gas inventory to produce said back-up quantity of first gas.

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15. A process for the temporary supply of a back-up quantity of a "first" gas to maintain the level of production of the first gas from a cryogenic separation of a gaseous mixture comprising the first gas and at least one other gas in the event of reduction in the level of production of said first gas from the separation, said separation comprising:

20 separating the mixture, or a mixture derived therefrom, in more than one cryogenic distillation system to produce liquefied first gas, each system retaining a portion of said liquefied first gas as inventory; and

vaporising a further portion of said liquefied first gas by indirect heat exchange against a process stream in at least one heat exchanger to produce said first gas; 25 said process comprising, in the event of reduction in the level of production of said first gas from the separation due to one of said cryogenic distillation systems ceasing to produce liquefied first gas, withdrawing liquefied first gas inventory from the or each one of said cryogenic distillation systems in which liquefied first gas production has not ceased and vaporising the withdrawn liquefied first gas inventory to produce said back- 30 up quantity of first gas.

16. The process according to Claim 15 wherein the gaseous mixture is air and the first gas is oxygen.